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Hess et al.

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(54) **FLAME SIMULATING ASSEMBLY**

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(73) Assignee: **Dimplex North America Limited**, Cambridge (CA)

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This patent is subject to a terminal disclaimer.

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Related U.S. Application Data

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(51) **Int. Cl.**[7] **G09F 19/00**
(52) **U.S. Cl.** **40/428**
(58) **Field of Search** 40/428; 362/92, 362/253, 806; 392/348; 472/65

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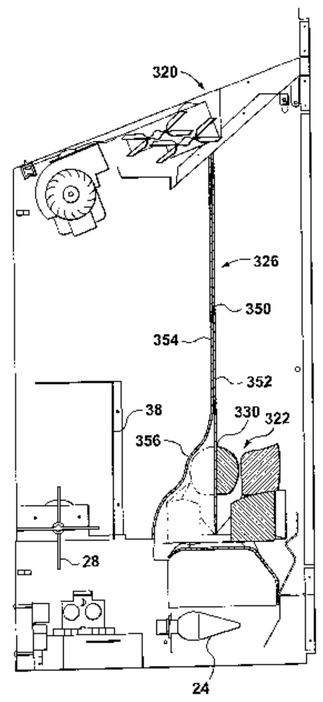
(57) **ABSTRACT**

A flame simulating assembly for providing an image of flames transmitted in a fluctuating light. The flame simulating assembly has a simulated fuel bed, a light source, a screen disposed behind the simulated fuel bed for diffusing and transmitting light, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. The simulated fuel bed defines a profile viewable by an observer. In addition, the screen includes a curved portion which is curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed. Also, the curved portion of the screen is positioned adjacent to the simulated fuel bed. The fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears to curve around the profile of the simulated fuel bed.

12 Claims, 11 Drawing Sheets



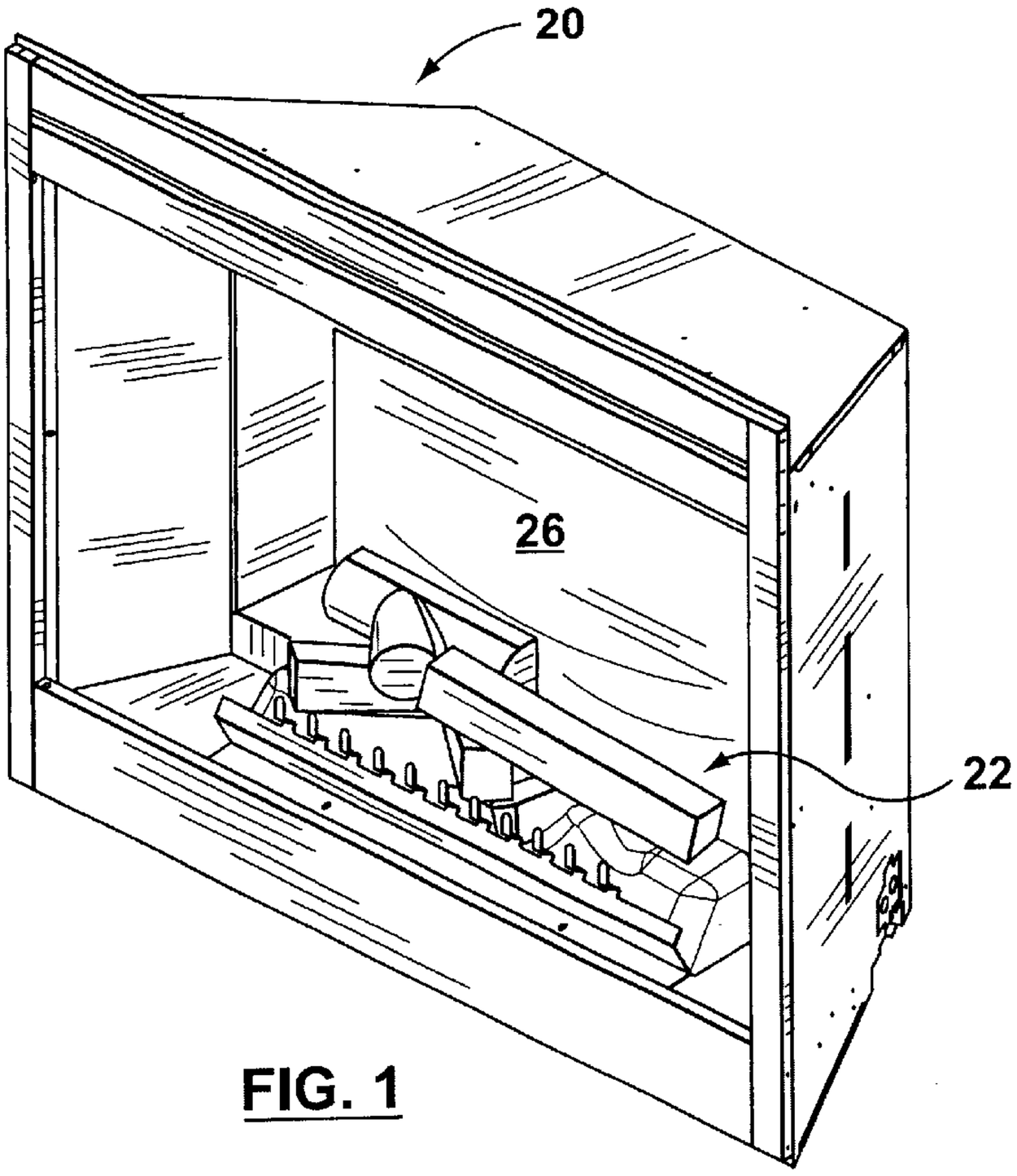


FIG. 1

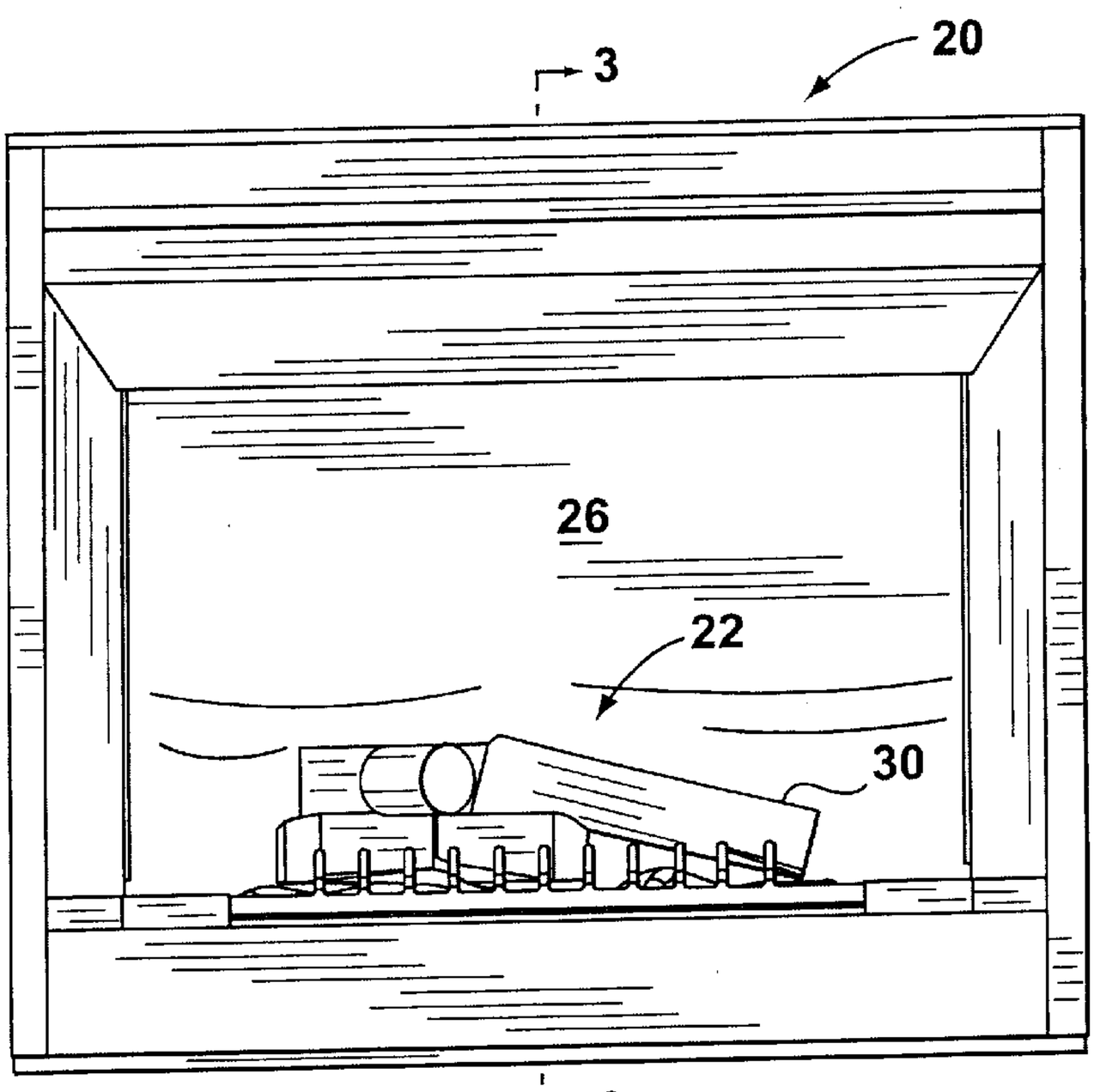


FIG. 2

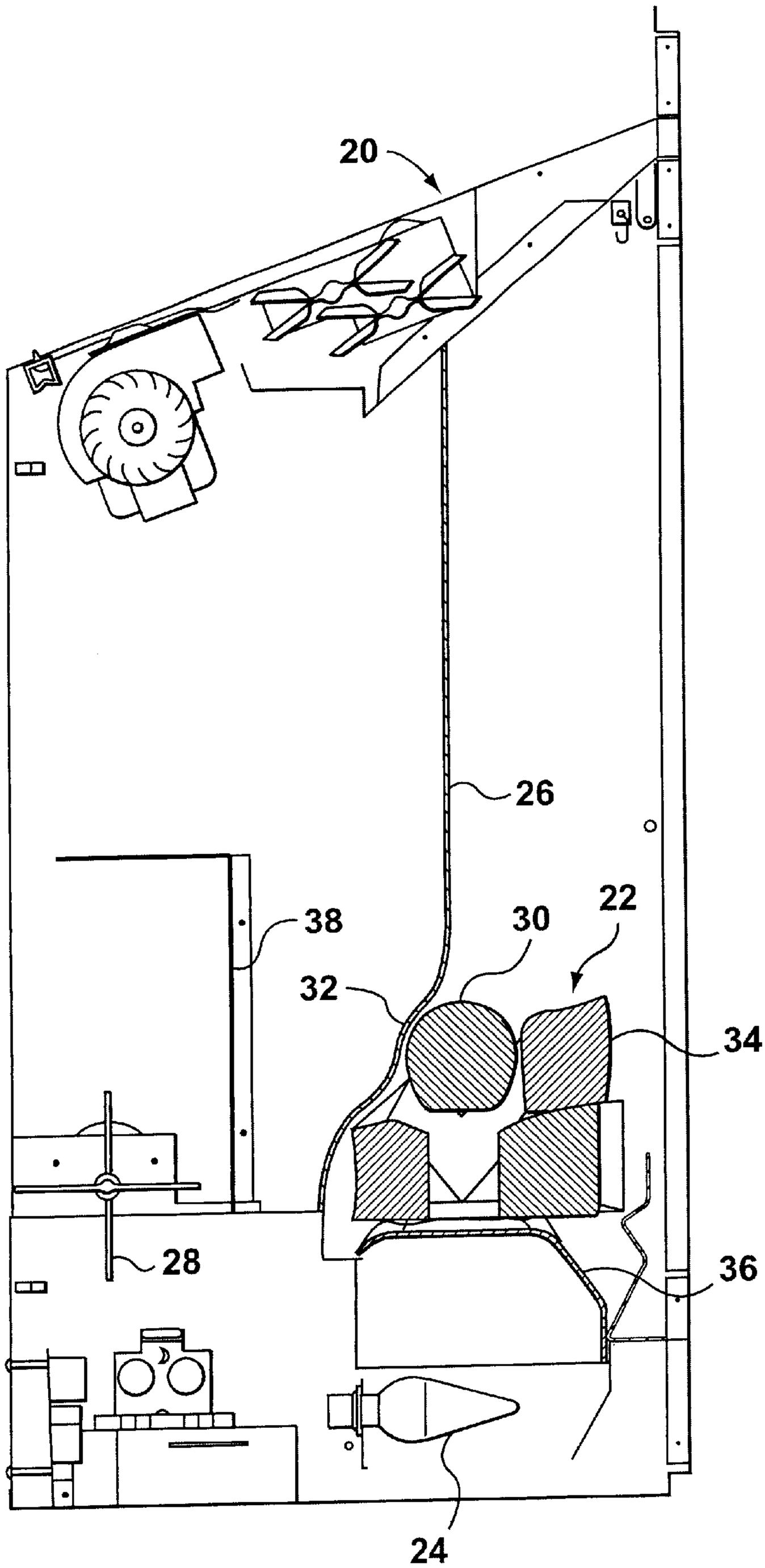


FIG. 3

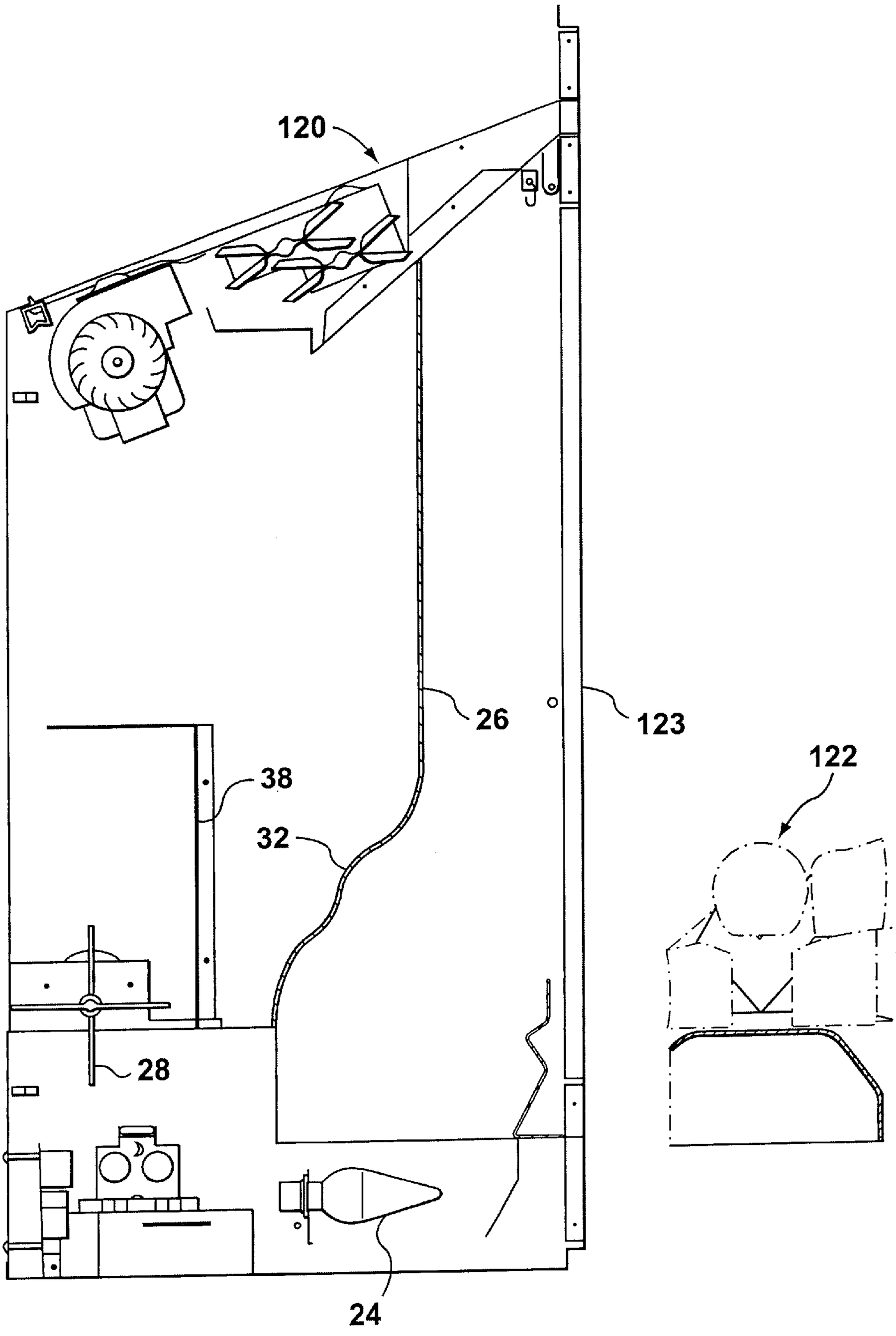


FIG. 4

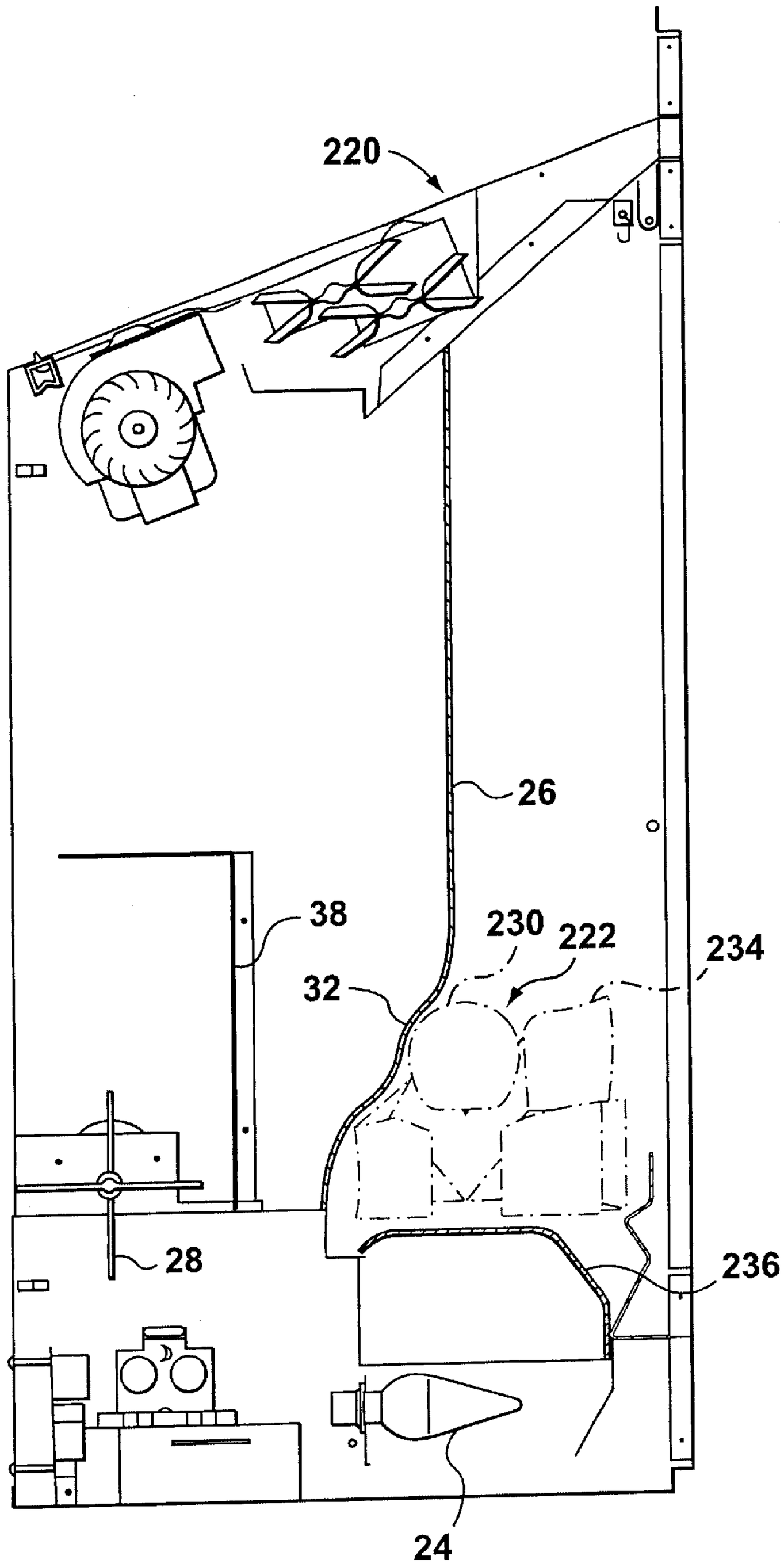


FIG. 5

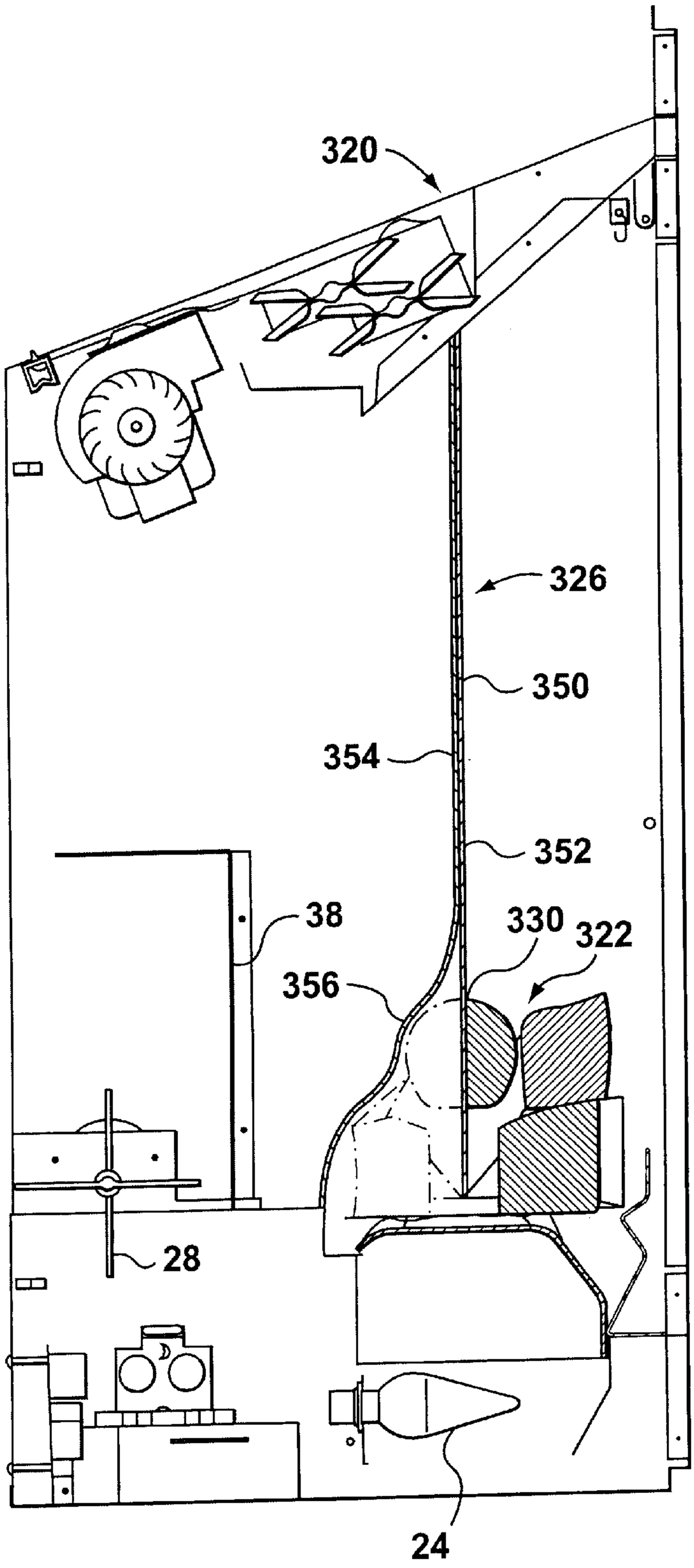


FIG. 6

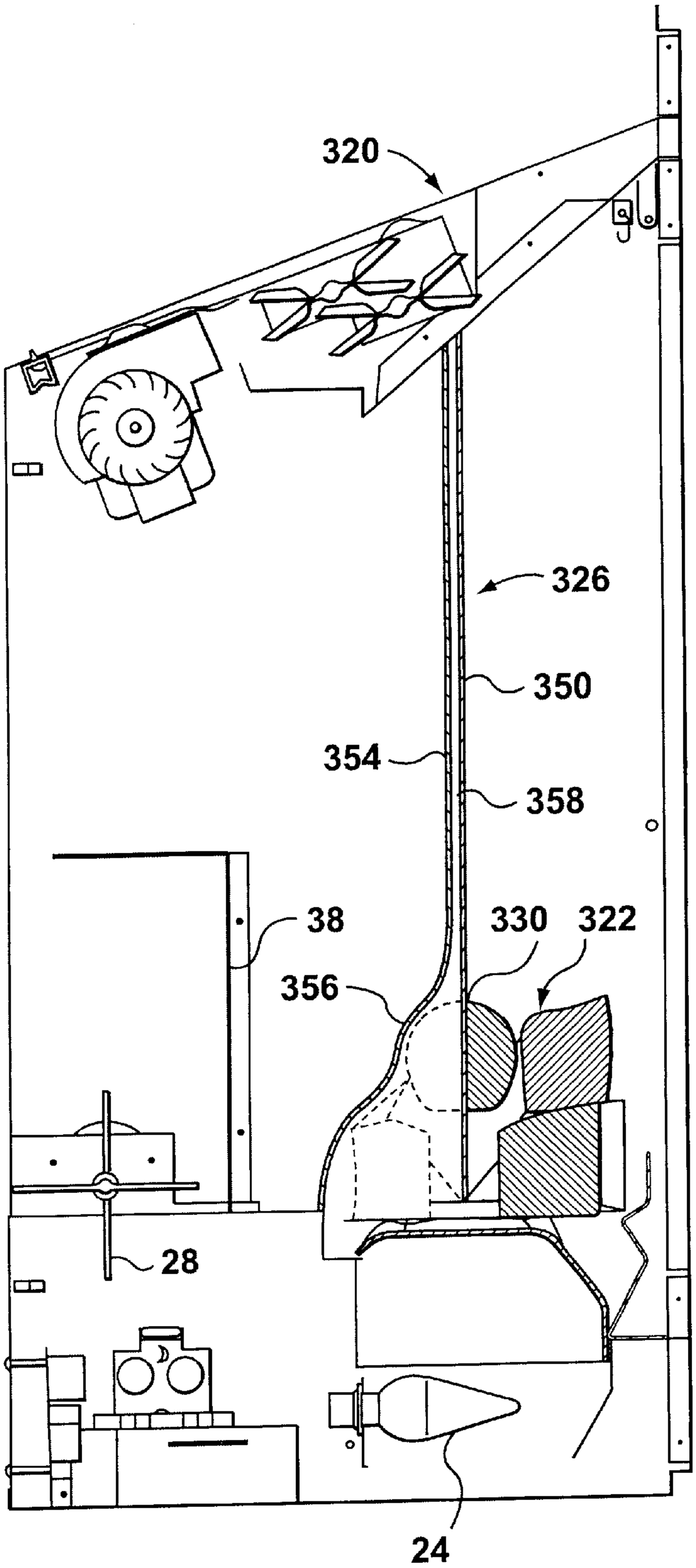


FIG. 7

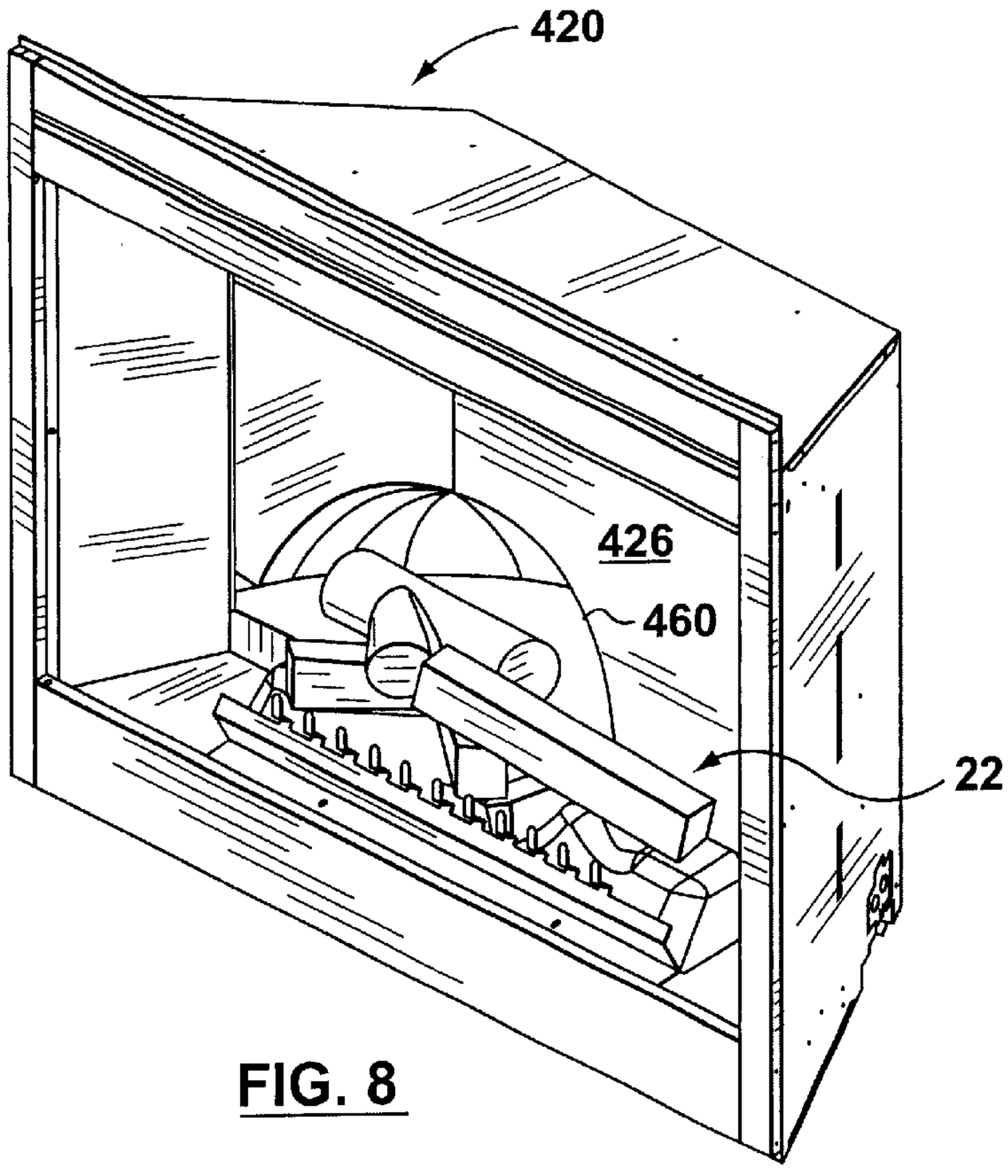


FIG. 8

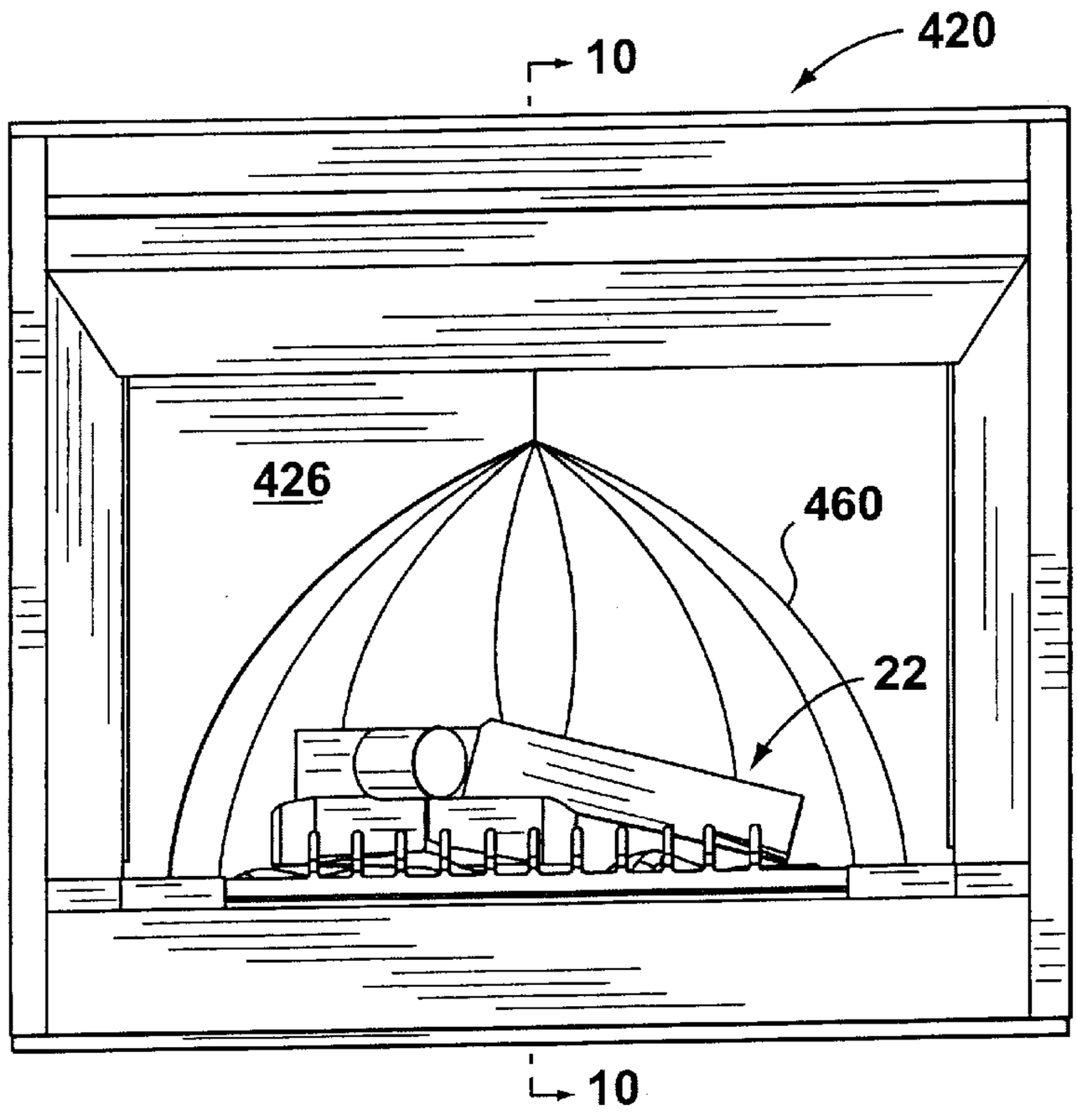


FIG. 9

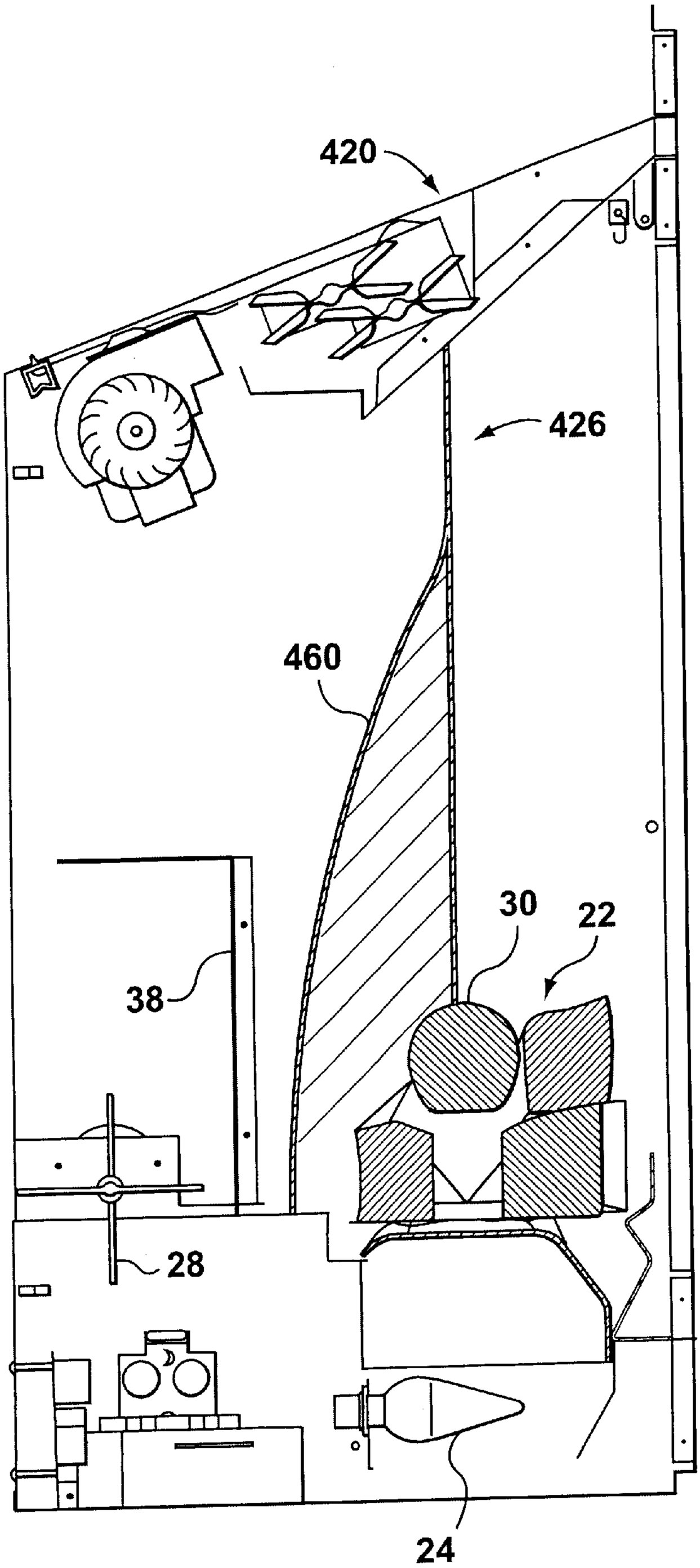


FIG. 10

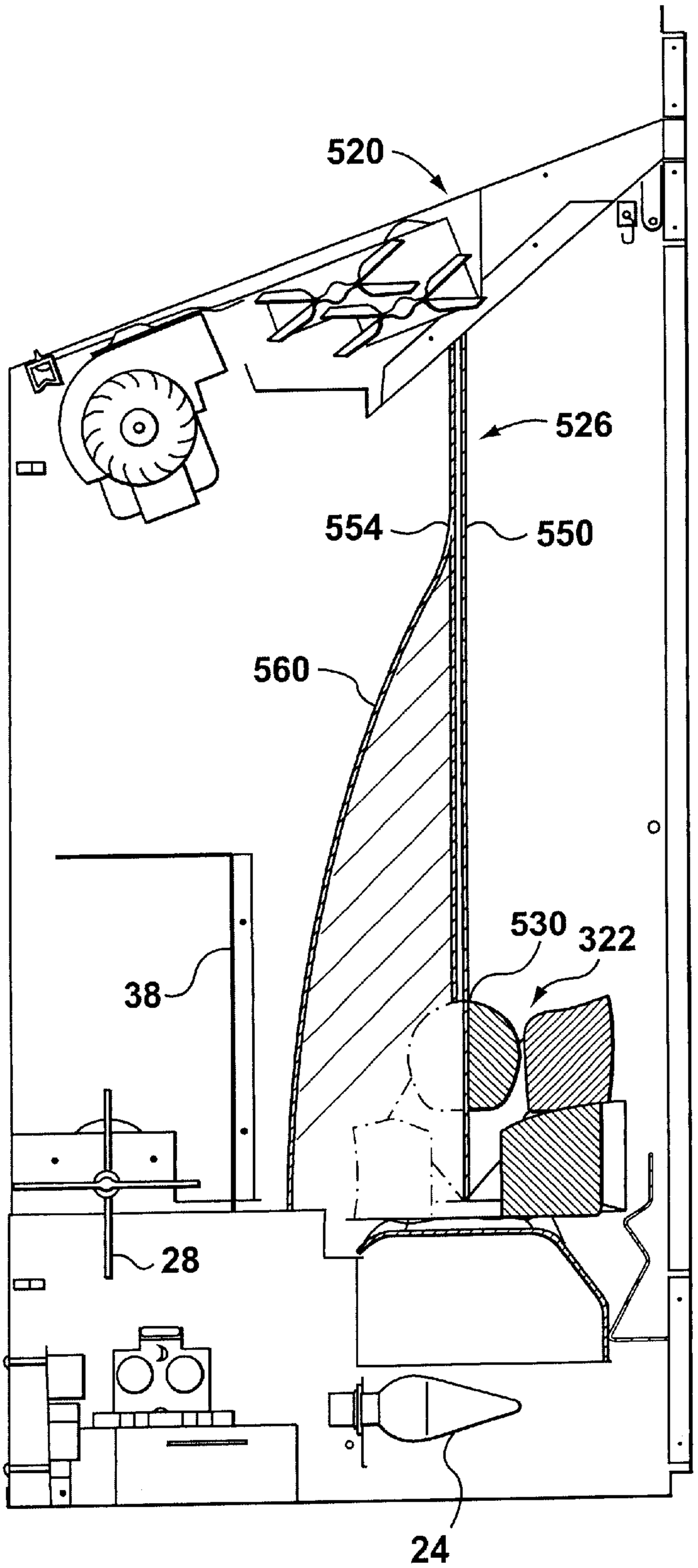


FIG. 11

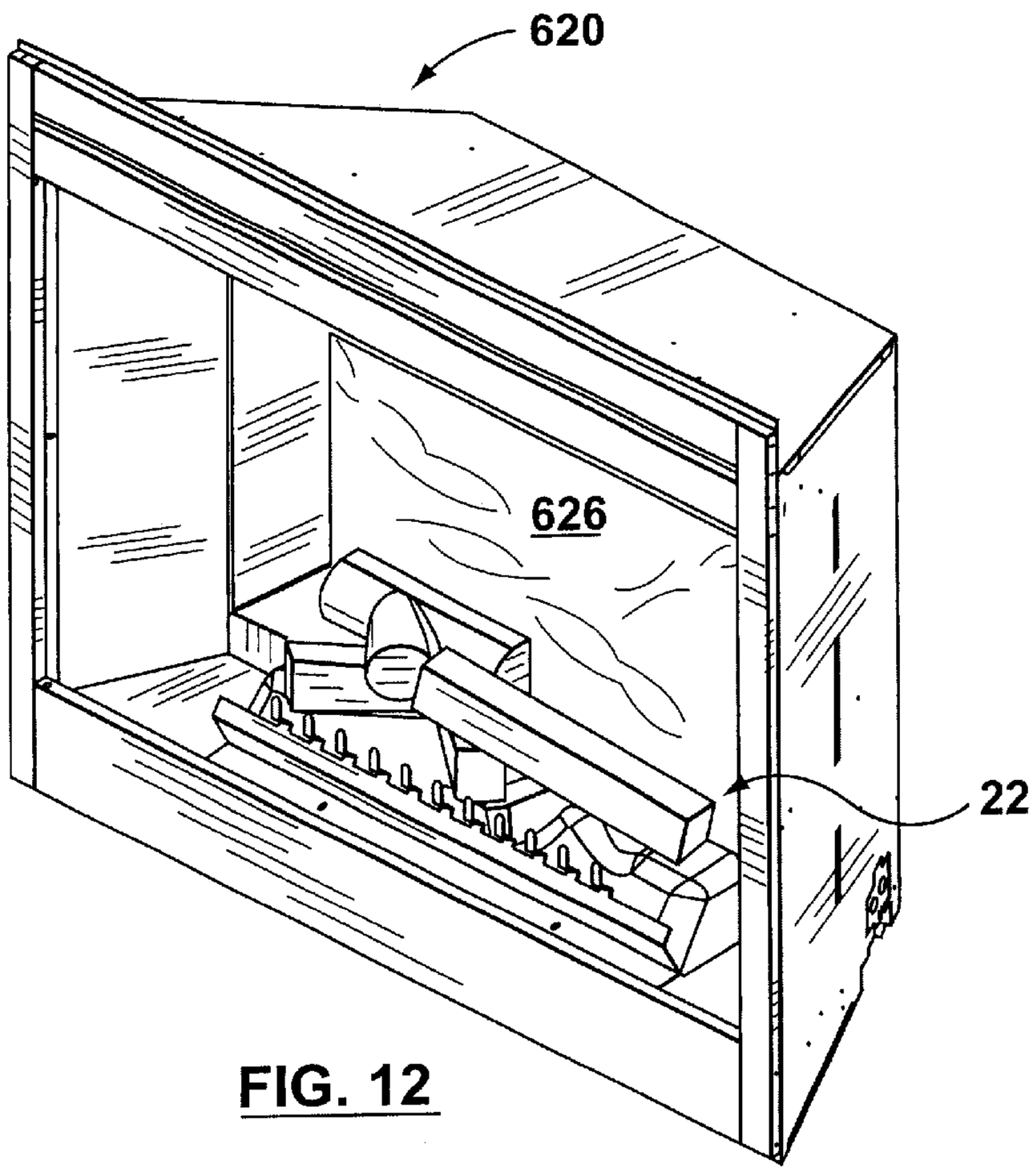


FIG. 12

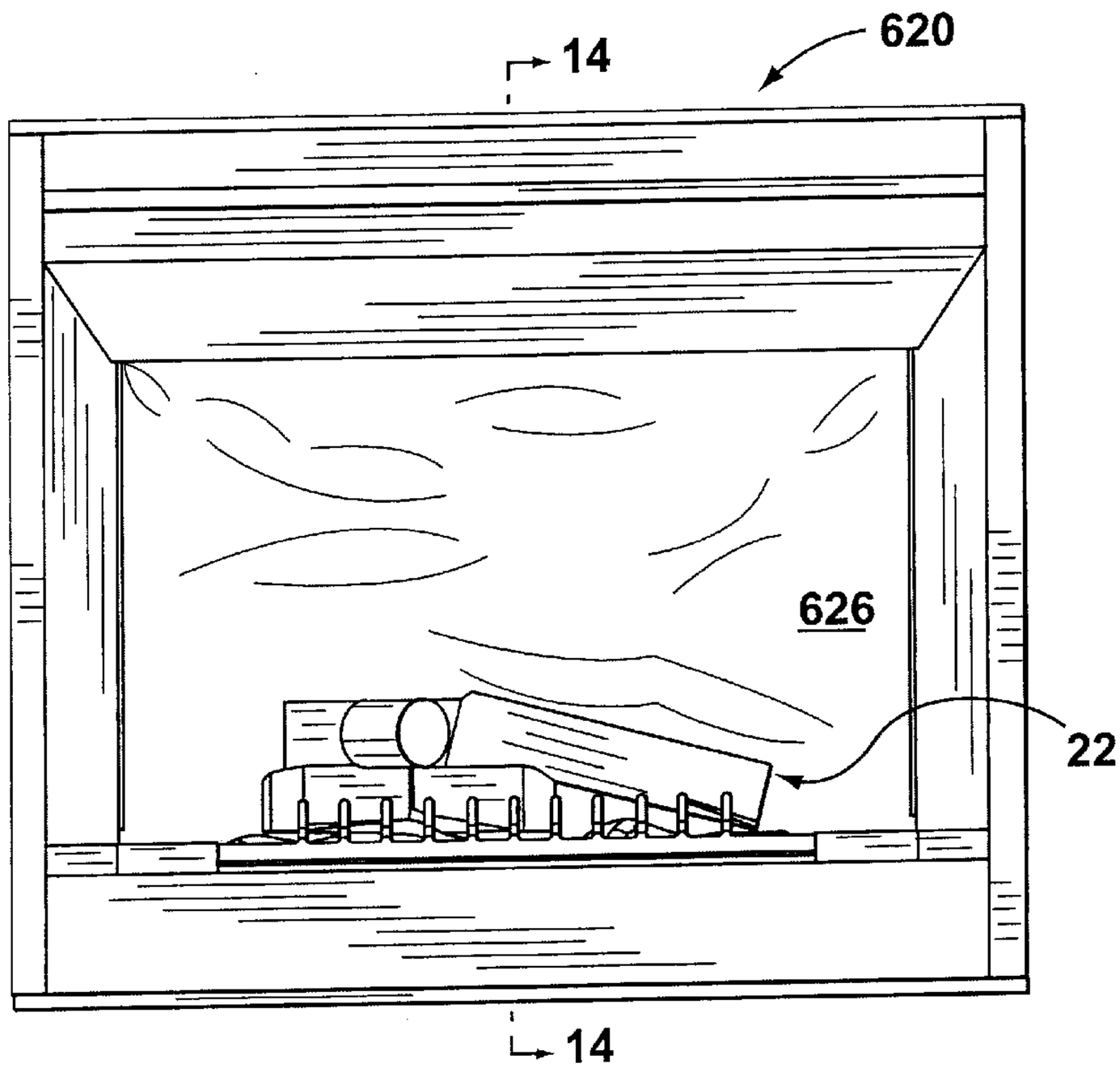


FIG. 13

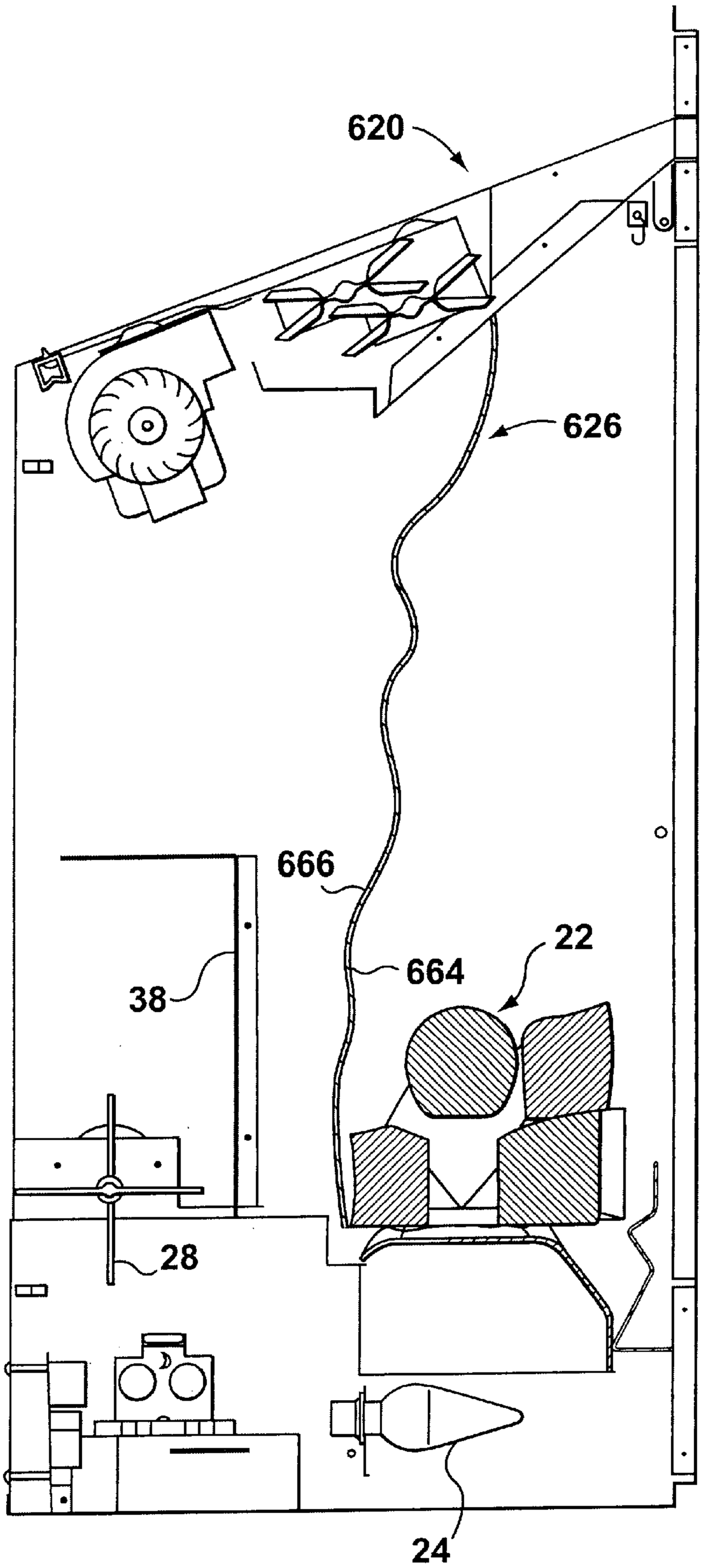


FIG. 14

FLAME SIMULATING ASSEMBLY

This is a continuation-in-part of application Ser. No. 09/443,324, which was a division of Application Ser. No. 08/868,948, filed Jun. 4, 1997 (now U.S. Pat. No. 6,050,011), which was a continuation-in-part of application Ser. No. 08/649,510, filed May 17, 1996 (now U.S. Pat. No. 5,642,580).

FIELD OF THE INVENTION

The present invention relates generally to simulated fireplaces and, more particularly, to flame simulating assemblies for electric fireplaces and the like.

BACKGROUND OF THE INVENTION

Electric fireplaces are popular because they provide visual qualities approximating those of real fireplaces without the costs and complications associated with venting of combustion gasses. An assembly for producing a realistic simulated flame for electric fireplaces is disclosed in U.S. Pat. No. 4,965,707 (Butterfield). In the Butterfield patent, an assembly is disclosed in which billowing ribbons and a diffusion screen are used for simulating flames. The assembly disclosed in the Butterfield patent also includes a screen which is generally planar and through which an image of flames is transmitted.

There is a need for an assembly for producing an image of flames that more realistically resembles flames from burning fuel.

SUMMARY OF THE INVENTION

In a broad aspect of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light having a simulated fuel bed, a light source, a screen disposed behind the simulated fuel bed for diffusing and transmitting light, and a flicker element for creating the fluctuating light positioned in a path of light from the light source. The simulated fuel bed defines a profile viewable by an observer. In addition, the screen includes a curved portion which is curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed. Also, the curved portion of the screen is positioned adjacent to the simulated fuel bed. The fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears to curve around the profile of the simulated fuel bed.

In another aspect of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light, the flame simulating assembly being adapted for use with a simulated fuel bed. The simulated fuel bed defines a profile viewable by an observer. This embodiment of the flame simulating assembly includes alight source, a screen positioned behind the simulated fuel bed for diffusing and transmitting light, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. Also, the screen includes a curved portion which is curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed. In addition, the curved portion of the screen is positioned adjacent to the simulated fuel bed. Accordingly, the fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears to curve around the profile of the simulated fuel bed.

In yet another aspect of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light, the flame simulating assembly being adapted for use with a simulated fuel portion. This embodiment of the flame simulating assembly includes a simulated ember bed portion, a light source, a screen, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. The simulated ember bed portion is adapted to receive the simulated fuel portion to form a simulated fuel bed. In this embodiment of the flame simulating assembly as well, the simulated fuel bed defines a profile viewable by an observer. The screen is positioned behind the simulated ember bed portion for diffusing and transmitting light, and includes a curved portion which is curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed. Also, the curved portion of the screen is positioned adjacent to the simulated ember bed portion. The result is that the fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears to curve around the profile of the simulated fuel bed.

In accordance with another aspect of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light including a simulated fuel bed, a light source, a screen having a front member disposed behind the simulated fuel bed and a diffusing member disposed behind the front member for diffusing and transmitting light, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. The simulated fuel bed defines a profile viewable by an observer. In addition, the front member has a partially reflective front surface for reflecting and transmitting light, and the diffusing member includes a curved portion. Also, the curved portion is curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed, and is positioned adjacent to the simulated fuel bed. Accordingly, the fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears to curve around the profile of the simulated fuel bed.

In another embodiment of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light including a simulated fuel bed, a light source, a screen disposed behind the simulated fuel bed for diffusing and transmitting light, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. In addition, the screen includes a conoid concavity positioned adjacent to the simulated fuel bed. The fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears to curve around the simulated fuel bed.

In yet another aspect of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light including a simulated fuel bed, a light source, a screen having a front member disposed behind the simulated fuel bed and a diffusing member disposed behind the front member for diffusing and transmitting light, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. In addition, the front member has a partially reflective front surface for reflecting and transmitting light, and the diffusing member has a conoid concavity positioned adjacent to the simulated fuel bed. Accordingly, the fluctuating light transmitted through the screen is attenuated and a three-

dimensional image of flames appears to curve around the simulated fuel bed.

In accordance with another aspect of the present invention, there is provided a flame simulating assembly for providing an image of flames transmitted in a fluctuating light including a simulated fuel bed, a light source, a screen having a front surface disposed behind the simulated fuel bed for diffusing and transmitting light, and a flicker element for creating the fluctuating light, the flicker element being positioned in a path of light from the light source. In this embodiment, the screen has a back surface which is curved in a vertical direction and in a horizontal direction. Also, the back surface of the screen is sufficiently spaced from the front surface thereof that the fluctuating light transmitted through the screen is attenuated and a three-dimensional image of flames appears through the screen.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood with reference to the drawings, in which:

FIG. **1** is an isometric view of a preferred embodiment of the flame simulating assembly;

FIG. **2** is a front view of the flame simulating assembly of FIG. **1**;

FIG. **3** is a cross-section of the flame simulating assembly of FIG. **1** taken along line **3—3** in FIG. **2**, drawn at a larger scale;

FIG. **4** is a cross-section of another embodiment of the flame simulating assembly of the invention;

FIG. **5** is a cross-section of yet another embodiment of the flame simulating assembly of the invention;

FIG. **6** is a cross-section of yet another embodiment of the flame simulating assembly of the invention;

FIG. **7** is a cross-section of yet another embodiment of the flame simulating assembly of the invention;

FIG. **8** is an isometric view of yet another embodiment of the flame simulating assembly of the invention, drawn at a smaller scale;

FIG. **9** is a front view of the flame simulating assembly of FIG. **8**;

FIG. **10** is a cross-section of the flame simulating assembly of FIG. **8**, taken along line **10—10** shown in FIG. **9**, drawn at a larger scale;

FIG. **11** is a cross-section of yet another embodiment of the flame simulating assembly of the invention;

FIG. **12** is an isometric view of yet another embodiment of the flame simulating assembly of the invention, drawn at a smaller scale;

FIG. **13** is a front view of the flame simulating assembly of FIG. **12**; and

FIG. **14** is a cross-section of the flame simulating assembly of FIG. **12**, taken along line **14—14** in FIG. **13**, drawn at a larger scale.

DETAILED DESCRIPTION OF THE INVENTION

Reference is first made to FIG. **1** to describe a preferred embodiment of a flame simulating assembly indicated generally by the numeral **20** in accordance with the invention. As can be seen in FIGS. **1–3**, the flame simulating assembly includes a simulated fuel bed **22**, a light source **24**, a screen **26**, and a flicker element **28**. The screen **26** is disposed behind the simulated fuel bed **22**. As will be described, the screen **22** is for diffusing and transmitting light.

As can be seen in FIG. **2**, the simulated fuel bed **22** defines a profile **30** which is viewable by an observer (not shown) observing, from a position in front of the flame simulating assembly **20**, the simulated fuel bed **22** and the screen **26**. FIG. **3** shows that the screen **26** includes a curved portion **32** which is curved in a vertical direction and in a horizontal direction to correspond to the profile **30** of the simulated fuel bed **22**. The curved portion **32** of the screen **26** is positioned adjacent to the simulated fuel bed **22**, as will be described. In addition, the flicker element **28** is positioned in a path of light from the light source **24**, and the flicker element **28** creates a fluctuating light. The fluctuating light transmitted through the screen **26** is attenuated and a three-dimensional image of flames appears to curve around the profile **30** of the simulated fuel bed **22**.

Preferably, the simulated fuel bed **22** includes a simulated fuel portion comprising a plurality of simulated logs **34** positioned on a simulated ember bed portion **36**. The simulated fuel bed **22** preferably is formed as described in U.S. Pat. No. 6,050,011, which is incorporated herein by reference.

The screen **26** may conveniently be formed by vacuum-forming a sheet of plastic to the desired shape. Preferably, the screen **26** comprises a single sheet of polyethylene having a haze (measured in accordance with ASTM D 1003-0) in excess of 30 per cent. The curvature of the curved portion **32** preferably follows the profile **30** of the simulated fuel bed **22** to give the appearance that the image of flames transmitted through the screen **26** is emanating from the simulated fuel bed **26**. In addition, the curvature of the curved portion **32**, in the horizontal direction along simulated fuel bed **26**, preferably tracks the particular angle at which a simulated log lies on the simulated ember bed portion **36**. At a horizontal portion on the simulated fuel bed **22** where no simulated fuel portion appears, the screen **26** is locally curved to be closer to the simulated fuel bed **22** to give the appearance that the image of flames transmitted through the screen **26** is emanating from the embers between the simulated logs **34** of the simulated fuel bed **22**.

The light source **24** can comprise one or more electric light bulbs, halogen lamps, or other suitable lighting means.

It will be appreciated that various arrangements can be used for the flicker element **28**. Preferably, the flicker element **28** is constructed as described in U.S. Pat. No. 6,050,011.

It is also preferred that the flame simulating assembly **20** includes a flame effect element **38**, shown in FIG. **3**. While various other arrangements can be employed, the flame effect element **38** is preferably in the form as described in U.S. Pat. No. 6,050,011.

In use, the flicker element **28** causes light from the light source **24** to fluctuate or flicker. The fluctuating light is reflected or transmitted from the flicker element **28** to the screen **26**, and is transmitted through the screen **26**. Also, the fluctuating light transmitted through the screen **26** is attenuated and appears as a three-dimensional image. The image of flames which is transmitted through the curved portion **32** of the screen **26** appears to curl, or curve, around the profile **30** of the simulated fuel bed **22**, providing a realistic image of flames. Because of the curvature of the curved portion **32**, the three-dimensional image of flames transmitted through the curved portion **32** appears to curve around the simulated fuel bed **22** similarly to flames curling around fuel in a real fire.

As noted above, it is preferred that the flame simulating assembly **20** includes the flame effect element **38**, positioned

in a path of the fluctuating light between the flicker element **28** and the screen **26**. The flame effect element **38** configures the fluctuating light so that an image of flames is transmitted through the screen **26**.

Additional embodiments of the invention are shown in FIGS. **4–14**. In FIGS. **4–14**, elements are numbered so as to correspond to like elements shown in FIGS. **1–3**.

In FIG. **4**, another embodiment of the flame simulating assembly **120** is shown in which the flame simulating assembly **120** is adapted for use with a simulated fuel bed **122**. The simulated fuel bed **122** can comprise a vacuum-formed plastic assembly formed and colored to resemble simulated fuel and a simulated ember portion supporting the simulated fuel, as shown in ghost outline in FIG. **4**. Alternatively, the simulated fuel bed can be, for example, a grate (not shown) supporting a simulated fuel portion (not shown).

In use, the simulated fuel bed **122** may be positioned adjacent to the screen **26** or disposed outside the flame simulating assembly **120**, adjacent to a transparent front panel **123**. The simulated fuel bed **122** in any event has a profile **130** viewable by an observer (not shown), and it is preferable that the simulated fuel bed **122** be positioned substantially adjacent to the curved portion **32**. The simulation of flames appears more realistic when the image of flames transmitted through the screen **26** appears to curve around the profile of the simulated fuel bed **122**, and this appearance is more easily achieved when the simulated fuel bed **122** and the curved portion **32** of the screen **26** are positioned in close proximity to each other.

FIG. **5** illustrates another embodiment of the flame simulating assembly **220**. In this embodiment, the flame simulating assembly **220** is adapted for use with a simulated fuel portion **234**, the simulated fuel portion **234** being shown in ghost outline in FIG. **5**. The flame simulating assembly **220** includes a simulated ember bed portion **236**. Preferably, the simulated ember bed portion **236** is vacuum-formed from plastic and colored so as to resemble an ember bed. The simulated ember bed portion **236** is adapted to receive the simulated fuel portion **234** to form a simulated fuel bed **222**. The simulated fuel portion **234** can represent logs of wood (as shown) or, alternatively, lumps of coal (not shown). It is preferred that the simulated ember bed portion **236** resembles an ember bed for the type of fuel represented by the simulated fuel portion **234**.

In the embodiment shown in FIG. **5**, the simulated fuel bed **222** has a profile **230** viewable by an observer (not shown). In use, the flicker element **28** causes light from the light source **24** to fluctuate or flicker. The fluctuating light is reflected or transmitted from the flicker element **28** to the screen **26**. Also, the fluctuating light transmitted through the screen **26** is attenuated and appears as a three-dimensional image. The image of flames which is transmitted through the curved portion **32** of the screen **26** appears to curve around the profile **230** of the simulated fuel bed **222**, providing a realistic image of flames. Because of the curvature of the curved portion **32**, the three-dimensional image of flames transmitted through the curved portion **32** appears to curve around the simulated fuel bed **222** similarly to flames curling around fuel in a real fire.

Preferably, the flame simulating assembly includes the flame effect element **38**, positioned in a path of the fluctuating light between the flicker element **28** and the screen **26**. The flame effect element **38** configures the fluctuating light so that an image of flames is transmitted through the screen **26**.

In another embodiment, shown in FIG. **6**, the flame simulating assembly **320** includes a screen **326** which comprises a front member **350** disposed behind the simulated fuel bed **322** having a partially reflective front surface **352** for reflecting and transmitting light, and a diffusing member **354**, for diffusing and transmitting light, is disposed behind the front member **350**. As can be seen in FIG. **6**, the screen **326** is located immediately behind the simulated fuel bed **322** so that the simulated fuel bed **322** is reflected in the partially reflective front surface **352** to give an illusion of depth. The simulated fuel bed **322** is formed to resemble one-half—i.e., the front half—of a real fuel bed. An image of the front half appears in the front surface **352**, to provide the appearance of a back half of the simulated fuel bed **322**, thereby providing the illusion of depth. Accordingly, the simulated fuel bed **322** has an apparent profile **330** appearing in the partially reflective front surface **352** and viewable by an observer who is observing the flame simulating assembly **320** from the front (not shown). Because of the combination of the simulated fuel bed **322** and the partially reflective front surface **352**, the image of flames which is transmitted through the screen **326** appears to arise in the center of the simulated fuel bed **322**.

The diffusing member **354** includes a curved portion **356** which is curved in a vertical direction and in a horizontal direction to correspond to the apparent profile **330** of the simulated fuel bed **322**, and positioned opposite to the simulated fuel bed **322**, behind the front member **350**. The curvature, in the vertical direction, of the curved portion **356** of the diffusing member **354** preferably follows the apparent profile **330** of the simulated fuel bed **322** in the partially reflective front surface **352**, to give the appearance that the image of flames is emanating from the center of the simulated fuel bed **322** and the image of the simulated fuel bed **322** reflected in the partially reflective front surface **352**. Also, the curvature of the curved portion **356** in the horizontal direction preferably tracks the particular angle at which a simulated log appears to lie in the simulated fuel bed **322** and follows the apparent location of the log in the reflective surface **352**. At a horizontal position on the simulated fuel bed **322** where no simulated log appears, the curved portion **356** is locally curved to be adjacent the front member **350** to give the appearance that the image of flames is emanating from the embers between the logs of the simulated fuel bed **322**.

Preferably, an upper part of the curved portion **356** is generally curved toward the front member **350**. This curvature tends to create the illusion to the observer that the image of flames transmitted through the screen **326** is licking over the simulated fuel included in the simulated fuel bed **322**. The flame simulating assembly **320** also includes the flicker element **28** positioned in a path of light from the light source **24**, for creating the fluctuating light. Accordingly, the fluctuating light transmitted through the screen **326** is attenuated and a three-dimensional image of flames appears to curve around the apparent profile **330** of the simulated fuel bed **322**.

It is also preferred that the flame simulating assembly **320** includes a flame effect element **38** positioned in a path of the fluctuating light between the flicker element **28** and the diffusing member **354**. As in the other embodiments described above, the flame effect element **38** configures the fluctuating light so that an image of flames is transmitted through the screen **326**.

As shown in FIG. **6**, except for the curved portion **356** and the portion of the front member **350** corresponding thereto, the diffusing member **354** and the front member **350** pref-

erably are positioned substantially adjacent to each other. However, as shown in FIG. **7**, the diffusing member **354** and the front member **350** can be positioned apart from each other so that an air gap **358** is disposed between the diffusing member **354** and the front member **350** above the curved portion **356**. Due to the air gap **358**, the image of flames transmitted through the screen **326** is further attenuated.

Another embodiment of the flame simulating assembly **420** is shown in FIGS. **8–10**. In the flame simulating assembly **420**, a screen **426** includes a conoid concavity **460** positioned substantially adjacent to the simulated fuel bed **22**. Preferably, and as can be seen in FIGS. **9** and **10**, the conoid concavity **460** extends substantially above the simulated fuel bed **22**. The fluctuating light transmitted through the screen **426** is attenuated and a three-dimensional image of flames appears to curve around the simulated fuel bed **22** in the conoid concavity **460**.

It is also preferred that the conoid concavity **460** is generally fluted, thereby including a plurality of alternating generally vertically oriented grooves **462** curving inwardly, from bottom to top, for further attenuating the fluctuating light transmitted through the conoid concavity **460**. The grooves **462** are preferably configured so that the image of flames transmitted through the conoid concavity **460** further simulates the turbulent and random pattern of real flames. Also, the flame simulating assembly **420** preferably includes the flame effect element **38**, positioned in a path of the fluctuating light between the flicker element **28** and the screen **426**. The flame effect element **38** configures the fluctuating light so that an image of flames is transmitted through the screen **426**.

In yet another embodiment, shown in FIG. **11**, the flame simulating assembly **520** includes a screen **526** comprising a front member **550** disposed behind the simulated fuel bed **322** and a diffusing member **554** disposed behind the front member **550**. The front member **550** has a partially reflective front surface **552** positioned adjacent to the simulated fuel bed **322**. The screen **526** is located immediately behind the simulated fuel bed **322** so that the simulated fuel bed **322** is reflected in the partially reflective front surface **552** to give the illusion of depth. As described, the simulated fuel bed **322** is formed to resemble one-half of a real fuel bed. An image of the simulated fuel bed **322** appears in the partially reflective front surface **552**, to simulate the other half of the fuel bed. Accordingly, the simulated fuel bed **322** has an apparent profile **530** appearing in the partially reflective front surface **552** and viewable by an observer (not shown). The diffusing member **554** includes a conoid concavity **560** positioned substantially adjacent to the image of the simulated fuel bed **322** appearing on the partially reflective front surface **552**. The fluctuating light transmitted through the screen **526** is attenuated and a three-dimensional image of flames appears to curve around the simulated fuel bed **322** in the conoid concavity **560**.

Preferably, the conoid concavity **560** is generally fluted, thereby including a plurality of alternating generally vertically oriented grooves **562** curving inwardly, from bottom to top, for further attenuating the fluctuating light transmitted through the conoid concavity **560**. The grooves **562** are preferably configured so that the image of flames transmitted through the conoid concavity **560** further simulates the turbulent and random pattern of real flames. It is also preferred that the flame simulating assembly **520** includes the flame effect element **38**, as shown in FIG. **11**. The flame effect element **38** configures the fluctuating light so that an image of flames is transmitted to the diffusing member **554**.

In yet another embodiment, as shown in FIGS. **12–14**, a flame simulating assembly **620** includes a screen **626** having a front surface **664** disposed behind the simulated fuel bed **22** for diffusing and transmitting light. The screen **626** has a back surface **666** which is curved in a vertical direction and in a horizontal direction in a manner chosen so as to further simulate the turbulent and random pattern of real flames. The curved back surface **666** of the screen **626** is sufficiently spaced from the front surface **664** thereof that the fluctuating light transmitted through the screen **526** is attenuated and a three-dimensional image of flames appears through the screen **626**. Preferably, the flame simulating assembly **620** includes the flame effect element **38**, as shown in FIG. **14**. The flame effect element **38** configures the fluctuating light so that an image of flames is transmitted to the curved back surface **666** of the screen **626**.

It will be evident to those skilled in the art that the invention can take many forms, and that such forms are within the scope of the invention as claimed. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained herein.

We claim:

1. A flame simulating assembly for providing an image of flames transmitted in a fluctuating light; viewable by an observer from a front side of the flame assembly, the flame simulating assembly having:

a simulated fuel bed, defining a profile thereof;

a light source;

a substantially vertical screen disposed behind the simulated fuel bed for diffusing and transmitting light, the screen including a curved portion positioned adjacent to the simulated fuel bed;

the curved portion being curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed; and

a flicker element for causing light from the light source to fluctuate, thereby creating the fluctuating light,

whereby the fluctuating light transmitted through the screen is attenuated by the screen to provide a three-dimensional image of flames which appears to curve around the simulated fuel bed.

2. A flame simulating assembly as claimed in claim **1** additionally including a flame effect element positioned in a path of the fluctuating light between the flicker element and the screen, to configure the fluctuating light.

3. A flame simulating assembly for providing an image of flames transmitted in a fluctuating light viewable by an observer from a front side of the flame simulating assembly, the flame simulating assembly being adapted for use with a simulated fuel bed, the simulated fuel bed defining a profile thereof, the flame simulating assembly having:

a light source;

a substantially vertical screen positioned behind the simulated fuel bed for diffusing and transmitting light;

the screen including a curved portion positioned adjacent to the simulated fuel bed;

the curved portion being curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed; and

a flicker element for causing light from the light source to fluctuate, thereby creating the fluctuating light,

whereby the fluctuating light transmitted through the screen is attenuated by the screen to provide a three-dimensional image of flames which appears to curve around the simulated fuel bed.

4. A flame simulating assembly as claimed in claim **3** additionally including a flame effect element positioned in a

path of the fluctuating light between the flicker element and the screen, to configure the light.

5. A flame simulating assembly for providing an image of flames transmitted in a fluctuating light viewable by an observer from a front side of the flame simulating assembly, the flame simulating assembly being adapted for use with a simulated fuel portion, the flame simulating assembly having:

a simulated ember bed portion, the simulated ember bed portion being adapted to receive the simulated fuel portion to form a simulated fuel bed;

the simulated fuel bed defining a profile thereof

a light source;

a substantially vertical screen positioned behind the simulated ember bed portion for diffusing and transmitting light;

the screen including a curved portion, the curved portion being curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed;

the curved portion of the screen being positioned adjacent to the simulated ember bed portion; and

a flicker element for causing light from the light source to fluctuate, thereby creating the fluctuating light,

whereby the fluctuating light transmitted through the screen is attenuated by the screen to provide a three-dimensional image of flames which appears to curve around the simulated fuel portion.

6. A flame simulating assembly as claimed in claim **5** additionally including a flame effect element positioned in a path of the fluctuating light between the flicker element and the screen, to configure the light.

7. A flame simulating assembly for providing an image of flames transmitted in a fluctuating light, viewable by an observer from a front side of the flame simulating assembly, the flame simulating assembly having:

a simulated fuel bed defining a profile thereof;

a light source;

a substantially vertical screen having a front member disposed behind the simulated fuel bed and a diffusing member disposed behind the front member for diffusing and transmitting light, the front member having a partially reflective front surface for reflecting and transmitting light and the diffusing member including a curved portion;

the curved portion being curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed; the curved portion being positioned adjacent to the simulated fuel bed; and

a flicker element for causing light from the light source to fluctuate, thereby creating the fluctuating light,

whereby the fluctuating light transmitted through the screen is attenuated by the screen to provide a three-dimensional image of flames which appears to curve around the simulated fuel bed.

8. A flame simulating assembly as claimed in claim **7** in which the diffusing member is spaced apart from the front member, such that the fluctuating light transmitted through the screen is attenuated to provide a three-dimensional image of flames which appears to curve around the simulated fuel bed.

9. A flame simulating assembly as claimed in claim **7** additionally including a flame effect element positioned in a path of the fluctuating light between the flicker element and the diffusing member to configure the fluctuating light.

10. A flame simulating assembly for providing an image of flames transmitted in a fluctuating light; viewable by an observer from a front side of the flame simulating assembly, the flame simulating assembly having:

a simulated fuel bed;

a light source;

a screen having a front surface disposed behind the simulated fuel bed for diffusing and transmitting light;

the screen having a back surface with a curved portion which is curved in a vertical direction and in a horizontal direction, the curved portion being positioned relative to the simulated fuel bed such that the image of flames transmitted through the screen appears to curve around the simulated fuel bed;

a flicker element for causing light from the light source to fluctuate, thereby creating the fluctuating light; and

the back surface of the screen being sufficiently spaced from the front surface thereof to result in a three-dimensional image of flames appearing through the screen.

11. A flame simulating assembly as claimed in claim **10** additionally including a flame effect element positioned in a path of the fluctuating light between the flicker element and the screen, to configure the fluctuating light.

12. A flame simulating assembly for providing an image of flames transmitted in a fluctuating light viewable by an observer from a front side of the flame simulating assembly, the flame simulating assembly having:

a simulated fuel bed defining a profile thereof;

the simulated fuel bed being viewable by the observer;

a light source;

a substantially vertical screen positioned behind the simulated fuel bed for diffusing and transmitting light, the screen including a curved portion, the curved portion being curved in a vertical direction and in a horizontal direction to correspond to the profile of the simulated fuel bed; and

a flicker element for causing light from the light source to fluctuate, thereby creating the fluctuating light,

whereby the fluctuating light transmitted through the screen is attenuated by the screen to provide a three-dimensional image of flames which appear to curve around the simulated fuel bed.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,718,665 B2
DATED : April 13, 2004
INVENTOR(S) : Hess et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

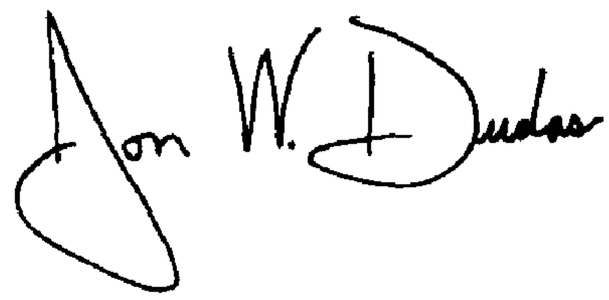
Column 8,
Line 22, replace “fluctuating light;” with -- fluctuating light, --.

Column 9,
Line 12, insert -- ; -- after the word “thereof”.

Column 10,
Line 12, replace “fluctuating light;” with -- fluctuating light, --.

Signed and Sealed this

Twenty-seventh Day of September, 2005



JON W. DUDAS
Director of the United States Patent and Trademark Office